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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,505	07/06/2006	Shahab Jahromi	BHD-4662-138	9555
23117 7590 08/27/2009 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER JOHNSON, CONNIE P				
ART UNIT		PAPER NUMBER		
1795				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/565,505

**Applicant(s)**

JAHROMI ET AL.

**Examiner**

CONNIE P. JOHNSON

**Art Unit**

1795

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 15-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SE-US)  
Paper No(s)/Mail Date 2/6/2009.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Amendment***

1. The remarks and amendment filed 2/6/2009 and 5/11/2009 have been entered and fully considered.
2. As required by the Non-Compliant Amendment mailed 5/6/2009, applicant has amended the claims to include proper claim identifiers.
3. Claims 15-36 are presented.
4. Claims 15 and 16 are amended.
5. Claims 33-36 are new.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 15-16, 20-24 and 27-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bae et al., U.S. Patent Publication No. 2004/0038150 A1 in view of Szmanda et al., U.S. Patent Publication No. 2003/0082477 A1 and further in view of Suwa et al., U.S. Patent No. 6,191,429 B1.

Bae teaches a method of making a photoresist composition for relief images comprising (page 6, [0065-0070]):

- a. applying the photoresist composition to a substrate,
- b. imagewise exposing the composition at 193nm,
- c. developing the exposed composition,
- d. subjecting the composition to chemical etching and
- e. removing (stripping) the resist from the substrate.

The method may be used for positive or negative compositions, thereby removing the exposed or unexposed portions of the photoresist composition (page 2, [0018]). Bae teaches the same steps as instantly claimed in the immersion lithography method. The photoresist composition may comprise more than one polymer. The composition comprises a photoacid generator (page 5, [0054]) and a polymer resin with a fluorinated group (page 3, [0038]). The polymer resin comprises also comprises photoacid labile groups, such as ester or acetal groups (page 3, [0031]). The acetal and ester groups are blocking groups as in claim 28. In example 7, Bae teaches that the fluorinated resin may be present in an amount of 6 to 80% by weight, based on the amounts of the components in the composition (page 8, [0091]). Bae also teaches the resin comprises hydroxyl naphthyl groups which are hydroxyl groups bound to an aromatic compound (page 2, [0022]). The resin also comprises acrylate and methacrylate polymers (page 3, [0031]). Bae does not teach a fluorinated compound in an amount of 0.5 to 50% by weight in the resist nor that the process is used to form an etched layer in a chip in immersion lithography.

Additionally, Szmanda teaches a photoresist comprising a polymer resin, photoacid generator (page 11, [0079-0082]) and a fluorinated dissolution inhibitor in an amount of 5 to 30% by weight based on solid content of the resist (page 11, [0084]) and

page 12, [0090-0091]). The fluorinated dissolution inhibitors also have acid-decomposing acetal and ester groups (page 12, 0090)). Therefore, the dissolution inhibitor is capable of increasing alkali-solubility under action of an acid. Bae teaches the resist composition is developed by an alkali solution. Therefore, it would have been obvious to one of ordinary skill in the art to add the fluorinated dissolution inhibitor of Szmanda in the resist composition of Bae to increase alkali-solubility of the resist composition.

Suwa teaches an immersion exposure method for processing semiconductor chips (col. 1, lines 25-30). Although Suwa does not specifically show the instantly claimed steps, Bae shows these same conventional lithography steps that are used. It would have been obvious to one of ordinary skill in the art to use an immersion exposure process in the method of Bae because the process of immersion exposure improves resolution in the photoresist composition (col. 2, lines 42-47 and col. 3, lines 1-5).

8. Claims 15, 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bae et al., U.S. Patent Publication No. 2004/0038150 A1 in view of Szmanda et al., U.S. Patent Publication No. 2003/0082477 A1 in view of Suwa et al., U.S. Patent No. 6,191,429 B1 and further in view of Houlihan et al., U.S. Patent No. 5,998,099.

Bae teaches a method of making a photoresist composition for relief images as relied upon above. Suwa, in analogous art, teaches that the immersion lithography process is used to make a semiconductor chip (col. 1, lines 25-30). The composition comprises a polymer resin with photoacid labile groups, such as ester or acetal groups

(page 3, [0031]). Bae does not teach a compound that has a pKa of less than 12 when unblocked in the photoresist composition.

Additionally, Houlihan teaches a lithography process for resist compositions. The composition comprises a polymer with acid-labile substituents pendent thereto and a photoacid generator wherein the acid generated has a pKa of 0 to 6 (col. 2, lines 46-60). The pendent groups of the polymer comprise acetal and ester groups (col. 6, lines 66-67). Houlihan also teaches that an acid compound with a pKa of 0 to 6 is used in the resist composition to effectively remove the acid labile (protecting groups) from the polymer (col. 10, lines 41-42). Therefore, it would have been obvious to one of ordinary skill in the art to use an acid compound wherein the pKa is 0 to 6 in the composition of Bae to efficiently cleave the acid labile groups of the fluorinated polymer as taught by Houlihan.

9. Claims 16, 18, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bae et al., U.S. Patent Publication No. 2004/0038150 A1 in view of Szmanda et al., U.S. Patent Publication No. 2003/0082477 A1 in view of Suwa et al., U.S. Patent No. 6,191,429 B1 and further in view of Berger et al., U.S. Patent Publication No. 2004/0033436 A1.

Bae teaches a lithography method of making a photoresist composition. The composition comprises a polymer resin with photoacid labile groups, such as ester or acetal groups (page 3, [0031]). Bae does not teach that the binder in the composition is a polymer with acid groups having a pKa less than 12.

However, Berger teaches a photoresist composition for microlithography (abstract). The composition comprises a fluorinated polymer with acidic groups that

may be protected by acid-labile groups and a photoactive component (page 2, [0020-0021] and page 5, [0060]). The acidic groups may comprise carboxylic acids, phenols and fluoroalcohols with a pKa of less than 9 (page 5, [0060]). The fluorinated polymer may comprise two or more acidic groups wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> may independently represent a carboxylic acid or ester (page 4, [0049-0050]). It would have been obvious to one of ordinary skill in the art to use the fluorinated polymer with a pKa of less than 9 in the composition of Bae because Berger teaches that fluorinated polymers with sufficient acid groups, such as fluoroalcohol groups and/or protected acid groups, are partially deprotected upon exposure to render the photoresist processable in aqueous alkaline developer (page 8, [0092]).

### ***Response to Arguments***

10. Applicant's arguments filed 2/6/2009, with respect to the rejection(s) of claim(s) 15-16, 20-24 and 27-32 under 103(a), claims 15, 17 and 19 under 103(a) and claims 16, 18, 25 and 26 under 103(a) have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, new ground(s) of rejection are made herein.

11. Applicant argues that the Ro8 surfactant in Bae is not clearly disclosed a fluor containing compound. Further, that according to the Dainippon website, the surfactant Ro8 is only used in amounts of 0.05 to 0.5% by weight, which is 5 times below the amount claimed.

Although the amount of surfactant in Bae still meets the limitations of claim 15 (0.5 to 50% by weight), Szmanda teaches a fluorinated dissolution inhibitor in amounts of 5 to 30% by weight, which meets the limitations of new claims 33-36. In the new

103(a) rejection, Szmanda is used to teach a fluorinated dissolution inhibitor in amounts of 5 to 30% by weight based on the solid content of the resist. The amount of the fluorinated dissolution inhibitor meets the limitations of new claims 33-36.

### ***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CONNIE P. JOHNSON whose telephone number is (571)272-7758. The examiner can normally be reached on 7:30am-4:00pm Monday thru Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Connie P. Johnson/  
Examiner, Art Unit 1795

/Cynthia H Kelly/

Supervisory Patent Examiner, Art Unit 1795